rots of the Solanaceae and on the tobacco wilts with their confusion of diseases described from different parts of the world and attributed to various organisms. It is the great merit of the author to have contributed so largely to the field of plant bacteriology. It is an almost equal merit to have clearly pointed out the lines for future progress.—H. HASSELBRING.

MINOR NOTICES

A popular guide to mosses.—Mrs. DUNHAM[4] has undertaken to present the mosses of the northeastern states in a non-technical way, so that the amateur may recognize at least their genera without using even a hand lens. The result is a very attractive little book, whose simple language and marginal illustrations should accomplish the purpose announced. If it succeeds, it will open up to the general student a group of plants present in every flora, and usually regarded as too difficult for even a speaking acquaintance.—J. M. C.

Plant diseases.—A second edition of MASSEE'S[5] very useful manual has just appeared, 5 years after the publication of the first edition. It differs from the former edition only in containing a supplement of 16 pages, giving statements concerning 20 diseases which are not included in the body of the text, or concerning which additional information is given.—J. M. C.

NOTES FOR STUDENTS

Evolution of species in Ceylon.—WILLIS[6] has followed his recent paper on the endemic flora of Ceylon[7] by developing still further his argument against natural selection as an explanation of the geographical distribution of species. His argument is based mainly upon statistics derived from TRIMEN'S *Flora of Ceylon*, in which the species are divided into 6 classes, ranging from "very common" to "very rare." He observes that in Ceylon the endemic species are the rarest, according to the foregoing classification, while species which are widespread outside of Ceylon are commonest there also. This not only appears from a consideration of the flora as a whole, but in every family the endemic species are the rarest. It also appears that within every family the groups of species into the rarity classes are remarkably alike. WILLIS regards these phenomena as the result of some natural cause working with practically even pressure throughout the whole plant kingdom, a cause entirely unlike natural selection, which is essentially differentiating in its results. This

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[4] DUNHAM, ELIZABETH MARIE, How to know the mosses; a popular guide to the mosses of the northeastern United States. 8vo. pp. xxv+287. Boston: Houghton Mifflin Co. 1916. $1.25.

[5] MASSEE, GEORGE, Diseases of cultivated plants and trees. 8vo. pp. xii+602. *figs. 173*. New York: Macmillan. 1915.

[6] WILLIS, J. C., The evolution of species in Ceylon, with reference to the dying out of species. Ann. Botany **30**:1–23. 1916.

[7] BOT. GAZ. **61**:82. 1916.

cause he claims is age, not the absolute age of a species, but its age in the locality. Thus endemic species are rare because they are "in the earlier stages of spreading."

WILLIS treats the two main objections to his theory as follows. The claim that the endemic species are really the oldest he answers with the evidence that frequently endemic species belong to widespread genera. These genera could not have originated in Ceylon; the endemic species must have arrived there late in the history of the genera in question. The other objection, which is merely the claim for natural selection, is that local species develop in response to local needs or conditions; but WILLIS finds that endemic species of a given rarity spread over an area of given diameter, although it may contain other kinds of soils, climates, and floras. Also the geographical boundaries of various endemic species do not coincide; that is, the species do not occupy jointly areas where special local conditions may exist. The arithmetical regularity of distribution of species within the various "rarity classes," and the geometrical regularity of the species boundaries, irrespective of physiographic or meteorologic conditions, must be explained by the mechanical, undifferentiating result of age.

In accordance with this theory, the figures given by WILLIS show that parasites, saprophytes, and climbers are "rarer" than independent plants, as should be expected, for they must have followed the others historically. It also appears that among water plants the dicotyledons are more common (therefore older) than the monocotyledons. Of angiosperms in general, WILLIS found no species that was "dying out." He believes that species die out only by accident, a more extensive accident being necessary for the disappearance of a "common" species than for a "rare one."—MERLE C. COULTER.

Securing complete germinations.—A difficulty often encountered by the geneticist is the failure of many seeds to germinate with desirable promptness. It is well known that in certain species of *Oenothera*, half or more of the seed-like structures contain no embryos, and that in many cases those seeds which do contain embryos are subject to delay in germination. DE VRIES[8] has found that in many cases he can more than double the number of prompt germinations by soaking the seeds for 2 days in water and then subjecting them submerged in water for 24 hours in an autoclave to a pressure of 6–8 atmospheres. The author assumes that the effect is due to the forcing of the water needed for germination through minute rifts in the hard portion of the seed coats. He gives a number of instances to show the contrast between seeds merely soaked, and those which have been subjected to pressure. In certain cases he found it advantageous to subject the seeds a second time to pressure. A very small percentage of the seeds resisted this treatment.

[8] DE VRIES, H., Uber künstliche Beschleunigung der Wasseraufnahme in Samen durch Druck. Biol. Centralbl. **35**:161–176. 1915.